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10/532,084	04/21/2005	Takashi Yasumura	050251	6480

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EXAMINER	
WU, IVES J	

ART UNIT	PAPER NUMBER
1713	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/532,084	YASUMURA ET AL.	
	Examiner	Art Unit	
	Ives Wu	1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/22/05*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☒ Claim(s) *10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/21;12/22/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

(1). **Claim 10** is objected to because of the following informalities: In claim 10, the total wt percentage of component B, C and D is from 10 ~ 51 wt%, the component A is from 50 ~ 90 wt%. When the total B, C, D components are used in amount of 51 wt% and minimum amount of component A is 50 wt%, the total exceeds 100 wt%.

(2). It is noticed that claim 5 and claim 7 are identically presented.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

(3). **Claims 1~4 and 8~20** are rejected rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura et al (US20020055030A1) in view of Hendershot et al (US006441060B1), Hefner Jr, et al (US004618658) and Nagasawa et al (US004205018).

(4). Okumura et al disclose a separator for solid polymer-type fuel cell produced by molding the resin composition which comprises an electroconductive agent and a radical-polymerizable thermosetting resin system by a resin molding method (Abstract, line 1-5).

As the electroconductive agent (or electrically conductive agent), a variety of components such as carbon powders, graphite powder, electrocarbon black powder These electroconductive agents can be used singly or in combination ([0015], line 1-9). The weight ratio of the electroconductive agent to the radical-polymerizable thermosetting resin system is about 55/45 to 95/5 ([0064], line 1-3).

It is sufficient that the radical-polymerizable thermosetting resin system comprises at least a radical-polymerizable resin, and the radical-polymerizable thermosetting resin system may comprise a radical-polymerizable thermosetting resin system or an oligomer having a α, β-ethylenically unsaturated bond (a polymerizable unsaturated bond). For example, vinyl ester-series resins, unsaturated polyester-series resins, urethane (meth)acrylates, polyester (meth)acrylates and the like. These radical-polymerizable resins can be used singly or in combination ([0018], line 1-11).

(a). Vinyl Ester-series Resin (e.g., epoxy (meth)acrylate) includes, for example, a reaction product of a compound having one or more epoxy groups in a molecule with an ethylenically unsaturated compound having a carboxyl group such as an unsaturated monobasic acid ([0019] - [0020]). As epoxy resin, there may be mentioned glycidyl ether-type epoxy resins, alicyclic epoxy resins ([0022], line 1-3). As the glycidyl ether-type epoxy resin, there may be mentioned bisphenol-type epoxy resin such as bisphenol – type epoxy resin, novolak-type epoxy resins, aliphatic epoxy resin ([0023], line 1-7). As to the ethylenically unsaturated compound having a carboxyl group such as an unsaturated monobasic acid, (meth)acrylic aicd, crotonic acid ([0032], line 1-5).

(b). Unsaturated polyester-series Resin ([0038]).

(c). Urethane (meth)acrylate, a reaction product of a polyurethane oligomer having an isocyanate group at its terminal position with the above hydroxyl C_{2-6} alkyl (meth)acrylate can be employed as the urethane (meth)acrylate ([0046] – [0047]). A conventional polyurethane oligomer obtainable with the use of excess amount of diisocyanate component relative to diol component can be used as the polyurethane oligomer. The polyurethane oligomer includes, for example, a reaction product of a diisocyanate component (e.g., an aromatic diisocyanate such as tolylenediisocyanate and diphenylmethanediisocyanate, an araliphatic diisocyanate, an alicyclic diisocyanate, and aliphatic diisocyanate with a diol component (e.g., C_{2-12} alkylene glycols, polyether diols such as polyoxy C_{2-4} alkylene glycols, polyester diols, polycarbonate diols).

As the radical-polymerizable diluent, there may be mentioned unsaturated carboxylic acids such as (meth)acrylic acid, vinyl pyrrolidone; aromatic vinyl compounds

such as styrene ([0060], line 1-3, line 11-12). The wt ratio of the radical-polymerizable resin to the radical-polymerizable thermosetting diluent can be usually selected within the range of about 100/0 to 20/80 ([0062], line 1-3).

As to the curing agent, there may be mentioned organic peroxides, for example, aliphatic peroxides ([0074], line 1-2).

The patentee's invention also include a separator for a solid polymer-type fuel cell formed with resin composition (e.g., carbon separate). The separator is excellent in gas-imperviousness and durability. Moreover, the resin composition has excellent moldability. Therefore, the process for producing the separator by molding the resin composition by means of a resin molding method is included. Moreover, in the process, the resin composition may be kneaded with a pressure kneader and molded ([0012]). The kneading temperature is not particularly limited, and is about room temperature to about 100 °C., preferably about room temperature to 50 °C ([0084]).

Illustrated in Examples 1 and 2, the preparation for thermosetting compositions is demonstrated. In Examples 3 and 4, the kneading and molded plate is obtained ([0107]).

(5). As to the component (B) of urethane-modified epoxy (meth)acrylate in a conductive resin composition in **independent claim 1**, Okumura et al **teach** reaction product of a compound having one or more epoxy groups in a molecule with an ethylenically unsaturated compound having a carboxyl group such as an unsaturated monobasic acid ([0020], line 6-10).

Okumura et al **do not teach** a urethane-modified epoxy (meth)acrylate resin.

However, Hendershot et al **teach** the foundry binder system comprising an epoxy resin and an acrylated organic polyisocyanate, a reactive unsaturated acrylic monomer, acrylic polymer, or mixtures thereof (Abstract, line 1-5).

The advantage of using the epoxy, acrylated organic polyisocyanate as foundry is to improve the benchlife of foundry mixes made with the foundry binder (Col. 2, line 53-56), moreover, the use of urethanized epoxy resin acrylate is evidenced by Nagasawa et al (US004205018) and Hefner Jr. et al (US004618658) wherein Nagasawa et al cite that generally speaking, the urethanized epoxy resin acrylate or methacrylate exhibits better curability (i.e.,. a shorter curing time) and solvent resistivity (Col. 3, line 8-11), and Hefner Jr. et al cite that these compositions illustrated in Example 1 and 2 are useful as intermediates to novel polymer modified vinyl esters and thermoset (cured) products.

Therefore, it would have been obvious at time the invention was made to replace the urethane-modified epoxy (meth)acrylate of Hendershot et al in the resin composition of Okumura et al in order to obtain the advantage cited in the preceding paragraph.

As to the component (C), a (meth)acrylate having average molecular weight of 500 to 10,000 which contains 20 to 80 wt% of an aromatic cyclic structural unit and/or an aliphatic cyclic structural unit and contains no active hydrogen atom in **independent claim 1**, Okumura et al disclose the urethane (meth)acrylate in paragraph (3) which includes examples of the molecule having a number average molecule weight of 500 to

10,000, also 20 to 80 wt% of an aromatic cyclic structural unit and/or an aliphatic cyclic structural unit and no active hydrogen atom.

As to the limitation of dependent **claims 2** and **3**, Okumura et al disclose the novolac type epoxy and other type of epoxy resin in paragraph (3) which includes 30 to 90 wt% of an aromatic cyclic structural unit and/or an aliphatic cyclic structural unit.

As to the limitation of **dependent claim 4**, Okumura et al disclose polycarbonate diols which is known as aromatic polyether diols.

As to the limitation of **dependent claim 8**, in absence of showing the criticality of the records, the optimization value of ratio between component (b) of urethane-modified epoxy (meth)acrylate and component (c) of (meth)acrylate to be 95/5 to 50/50 in a known process renders *prima facie obviousness* within one ordinary skill in the art. *In re Boesch, 617* F.2d, 276, 205 USPQ 215, 219 (CCPA 1980).

As to the limitation of **dependent claim 9**, Okumura et al disclose the wt ratio of the electroconductive agent to the radical-polymerizable thermosetting resin system is from 55/45 to 95/5 ([0063], line 1-3), in other words, the content of component A is to be 55 to 95 wt%.

As to the limitation of **dependent claim 10**, Okumura et al disclose the thermosetting to be 12 wt%, reactive diluent (styrene) to be 8 wt%, conductive fillers to be 80 wt% in Example 2, the distribution of components B, C such as 6 wt% of B taught by Hendershot et al and 4 wt% of urethane-(meth)acrylate C taught by Okumura is within 12 wt% meet the instant claim.

(6). **Claims 5** and **7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura et al (US20020055030A1) in view of Hendershot et al (US006441060B1), Hefner Jr, et al (US004618658) and Nagasawa et al (US004205018), and further in view of Toshiro et al (JP 03-199230).

As to the limitation of dependent **claims 5** and **7**, Hendershot et al do not teach the polycarbonate diols (polyetherpolyol) to be alkylene oxide adduct of a multinucleate phenolic compound.

However, Toshiro et al teach the copolymer polycarbonate diol which is a compound (e.g. phosgene) requiring a dehydrochlorinating process, an alkylene carbonate, a diaryl carbonate or a dialkyl carbonate is reacted with an aliphatic diol prepared by blending 20-80 wt% adduct of a 2,2-(4-hydroxyphenyl)propane shown by the formula with an alkylene oxide and hexanediol to give the object polymer (Constitution).

The advantage of using the polycarbonate diols having an aromatic cyclic structural unit and/or aliphatic cyclic structural unit to be an alkylene oxide adduct of a multinucleate phenolic compound taught by Toshiro et al (JP 03-199230) in the urethane (meth)acrylate is to provide excellent mechanical strength, wet heat resistance, low-temperature characteristics, etc., in the polyurethane product (Abstract).

Therefore, it would have been obvious at time the invention was made to use the polyetherpolyol of Toshiro et al for the polycarbonate diols taught by Okumura et al in order to obtain the advantage cited in the preceding paragraph.

(7). **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura et al (US20020055030A1) in view of Hendershot et al (US006441060B1), Hefner Jr, et al (US004618658) and Nagasawa et al (US004205018), and further in view of Takeshi et al (JP 2000-351843).

(8). As to the limitation of **dependent claim 6**, Okumura et al **teach** the radical-polymerizable thermosetting resin including epoxy-acrylate resin, polyester acrylate resin, urethane acrylate resin ([0019], [0046], [0051]). Okumura et al **do not teach** the polyether polyol acrylate.

However, Hendershot et al **teach** the reactive unsaturated acrylic monomer including urethane acrylated oligomer and polyether acrylates, polyester acrylate and acrylated epoxy resins (Col. 5, line 38-42). Polyether acrylated is reaction product of polyether diols or polyol with methacrylic acid. The reactive unsaturated acrylic monomer, polymer, or mixture thereof, is preferably as part of the Part II (Col. 5, line 24-25)

In view of the functionally equivalent reactive acrylate, it would have been obvious at time the invention was made to use the polyether acrylate of Hendershot et al instead of polyester acrylate, urethane acrylate, epoxy acrylate in the thermosetting resin of Okumura et al based on their recognized interchangeability as a functionally equivalent reactive acrylate. Alternatively, it would have been obvious to add the polyether acrylate of Hendershot et al in the thermosetting resin of Okumura et al to form a mixture of reactive acrylates.

(9). Both Okumura et al and Hendershot et al **do not teach** the polyether acrylate is derived from a polyether polyol having an aromatic cyclic structural unit and/or aliphatic cyclic structural unit.

However, Takeshi et al **teach** the polycarbonate polyol (meth)acrylate (Title).

The advantage of using polycarbonate polyol (meth)acrylate is to improve storage stability, and a solid electrolyte utilized the acrylate (Abstract).

Therefore, it would have been obvious at time the invention was made to use a polyether polyol (meth)acrylate such as polycarbonate polyol (meth)acrylate taught by Takeshi et al for the reactive acrylate of Hendershot et al in the thermosetting resin of Okumura et al as a vinyl ester-series resin in order to obtain the advantage cited in the preceding paragraph.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ives Wu whose telephone number is 571-272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner: Ives Wu
Art Unit: 1713
Date: February 21, 2005

DAVID W. WU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700